

Testimony of Roy V. Harris, Jr.
NASA Aeronautics Support Group
to the
Subcommittee on Science, Technology and Space
United States Senate Committee on Commerce

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Mr. Chairman and distinguished members of the Subcommittee on Science, Technology and Space, the NASA Aeronautics Support Team (NAST) is delighted to have this opportunity to present its views on NASA's aeronautics program. NAST is a private, nonprofit organization advocating for "the first A" in NASA -- aeronautics research -- which we believe is essential for a safe and effective U.S. air transportation system, superior U.S. military aviation technology, and an internationally competitive U.S. civil aircraft industry.

We are concerned that NASA's aeronautics program has been reduced by about one-third in recent years (See attached chart 1.), and that the Bush FY02 budget proposes additional reductions that could result in funding at a level of about one-half the FY 1998 aeronautics program (or, less than 4% of NASA's 2002 overall budget). It should be noted that this estimate is based on our own analysis of the of the FY02 budget proposal. NASA no longer has a line item in its budget for aeronautics, making it very difficult for Congress and the public to determine how much (or how little) is being spent in this very important area. (See attached charts 2 through 5.)

We are also aware that NASA is developing an aggressive "Aeronautics Vision for the 21st Century" to be released by September 2001. We applaud this effort and believe that it is a necessary step in revitalizing NASA's aeronautics program. However, we also believe that the continued reductions in funding for aeronautics research are inconsistent with any realistic plan to implement the vision.

We are encouraged by passage of the amendment offered by VA/HUD appropriations subcommittee chairman Christopher Bond (R-MO) and ranking Democrat Barbara Mikulski (D-MD) to increase funding for Function 250 by \$1.44 billion in FY2002. It is our understanding that \$518 million of that amount is designated for NASA. We hope that a significant portion of these funds will be allocated for aeronautics research.

U.S. Aviation in Crisis

Twenty-five years ago, the U.S. had over 90% of the world market for commercial aircraft sales. Ten years ago the U.S. share of that market had dropped to about 70%. Today our market share is about 50%, and some project that it will reach as low as 30%

in the near future. Still, aircraft sales are a large positive contributor to the U.S. trade balance, 41 billion dollars in 1998 and \$33 billion in 1999. Aircraft sales have a very high leverage on balance of trade. For example, one Boeing 747 sold overseas cancels out ten thousand foreign automobiles sold in this country. In addition, civil aviation directly employs about 800,000 highly paid workers, and another 2 million support workers. We cannot afford to give this lucrative market away to our foreign competitors.

Realizing the societal benefits of this huge potential market in which they are gaining the competitive advantage, the European Commission has laid out an aggressive plan: In a report entitled "European Aeronautics: A Vision for 2020" they state their two ultimate goals -- global aeronautics leadership in Europe, and a world class European air transportation system that will be copied by the rest of the world. It recognizes that "aeronautics is a particularly high-tech business working on long lead times and requiring huge capital sums". The report recommends the creation of an "Advisory Council for Aeronautics Research in Europe" and states that it "must be facilitated by an increase in public funding", and that "total funding required from all public and private sources over the next 20 years could go beyond 100 billion Euros" (about \$95 billion).

It seems incomprehensible to us that while our European competition is calling for increased government funding for aeronautics research in order to gain leadership over the U.S. and eliminate the only U.S. industry that produces a large positive balance of trade, that our government is continuing to reduce its support for this investment in our future.

Perhaps even more important, the U.S. transportation system is headed toward a major crisis. The problems that we have been experiencing with increasing flight delays and near misses are just the tip of the iceberg. Air traffic will nearly double in the next decade and will triple in 20 years. The U.S. transportation system will completely choke in about 8 to 10 years if solutions are not found. The FAA and the airlines are focused on finding solutions to the very significant problems that exist today, while NASA needs to be doing more to develop solutions to the vastly more difficult problems looming in the future.

As air travel triples in the next two decades, it will also be necessary to make significant improvements in aviation safety and environmental impact. Despite an alarming increase in aviation accidents in recent years, the aviation accident rate is still very low and air travel remains the safest method for long distance travel. Nevertheless, even if we can maintain the current low accident rate and as air traffic significantly increases in the coming decades, we will see a dramatic increase in aviation accidents if the already low accident rate isn't significantly reduced. Some have projected that a failure to reduce the accident rate will result in a major accident every week within the next two decades. In addition, noise and pollution problems at our major airports will become significantly worse as air travel increases

A safe, effective, and efficient national transportation system with ample capacity to match the increasing demand is essential for the U.S. economy to continue to grow. It is necessary in order to bring goods to market, parts and supplies to our factories, and

people to all points of the globe. It is also absolutely essential for the continued growth of e-commerce, since products bought over the internet must be delivered via the transportation system. The national airway system is the only component of our transportation system (air, rail, highway, and sea) that has any hope of expanding to meet the needs of a growing U.S. economy. The coming transportation crisis could bring an end to U.S. economic expansion and will be a quality of life issue for all Americans.

NASA also has an important role to play in military aviation technology. The first NASA (then NACA) aeronautical laboratory at Hampton, VA and the first U.S. military aeronautical laboratory at Dayton, OH were authorized by the same act of Congress in 1915 (a reaction to the realization, after World War I, that Europe was ahead of the U.S. in aviation technology). Both facilities initially focused on military aviation technology. Thus, a partnership evolved in which NACA performed basic research and investigated long-term potential applications and DOD focused on development testing and near-term applications.

Numerous aeronautics "breakthroughs" have resulted from this very cost-effective partnership. Some recent examples include shaping for stealth; multi-axis thrust vectoring exhaust nozzles integrated with aircraft flight-control systems; fly-by-wire flight control technologies; high-strength, high-stiffness fiber composite structures; and tilt-wing rotorcraft technology. Many of these advances are now finding widespread use in both military and civil aircraft. We believe that the U.S. has produced second-to-none U.S. military aircraft for 86 years as a direct result of this partnership. Now, for the first time, NASA's participation in the partnership seems to be threatened.

In a recent letter to the Secretary of Defense, the NASA Administrator stated that: "This program [the NASA Advanced Aircraft Program (AAP)] has been a key element of our partnership with the Air Force for many years. Increasing budget pressures over the last several years have not abated and have led us to consider terminating the AAP." It is our understanding that the AAP is zero-funded in FY02.

Throughout their history, NACA and NASA have invested heavily in world class, national test facilities (such as wind tunnels, structural test facilities, simulators, and flight test facilities) and have developed a technical staff of scientists, engineers, and technicians who were second-to-none in the world. NASA has become the national 911 for both civil and military aviation problems, and is the only federal agency with the in-house expertise, experimental test facilities, computational tools, and far-term research focus required to provide long-term solutions to future civil and military aviation problems. Unfortunately, funding for NASA's aeronautics program has been reduced in recent years to the point that we are losing our depth of expertise and the national test facilities are being starved for adequate maintenance and needed upgrades.

We agree with the 1999 report by the Committee on Strategic Assessment of U.S. Aeronautics of the National Research Council stated that: "Aviation is an R&T-intensive industry." "...future capability rests solidly on today's aeronautics R&T investment." "...continued reductions in funding for aeronautics R&T may have irreversible

consequences. Once the [leadership] position of the United States in aeronautics is lost, it will be exceedingly difficult to regain because of the difficulty in reassembling the infrastructure, people, and investment capital."

Since the publication of that report, NASA funding for aeronautics research has continued to decline. If the current low level of funding for NASA aeronautics research continues, it is a certainty that the United States will not remain a world leader in aeronautical science and technology for either civil or military applications.

The NASA Aeronautics Budget Picture

As mentioned earlier, the NASA aeronautics budget was reduced by about one-third in FY99 and FY00. Almost all work on developing the technologies for a future U.S. supersonic airliner was terminated. In addition, the Advanced Subsonic Technology Program, which was focused on developing the pre-competitive technologies that would ultimately make U.S. aircraft more efficient, improve noise and emissions, and reduce ticket prices, was also cancelled. We believe that both of these classes of aircraft will be very important to U.S. civil and military competitiveness in the future, and that new technologies unique to NASA's expertise and test capability will be required. Although some of the work from these programs has continued in other programs, we believe that much more work is needed.

In FY01, the aeronautics budget essentially remained stable with respect to FY00. The Bush FY02 budget proposes two additional major reductions. The elimination of all NASA rotorcraft research and, as best we can understand it, essentially all military aviation technology. This effectively severs the long-standing, cost-effective partnership on which the U.S. depends for military superiority. Although we believe the Aviation System Capacity program, the Aviation Safety program, and the Small Aircraft Transportation System program are adequately funded in FY02, the net effect is an additional 20% reduction to the overall NASA aeronautics program.

We understand that the budget pressures facing NASA are severe, and we understand the need for the development of new technologies for more efficient space launch capability. However, we do not believe that the nation can afford to sacrifice NASA's traditional aeronautics research role to satisfy space program demands.

Regaining U.S. Preeminence in Aeronautics Through NASA Research

The good news is that NASA has the capability to solve most of the nation's aeronautics problems. Research currently underway can be expanded to capitalize on the expertise and national test facilities already existing at the NASA Aeronautical Research Centers. NASA has programs underway that are aimed at making improvements in many of the key areas. These programs can be significantly expanded and other new programs can be developed to meet the long-term national technology needs for civil and military aviation.

Aeronautics is not a mature science and many new concepts are emerging from NASA research that could revolutionize aviation. Some examples are: very-large blended-wing-body aircraft for both civil and military missions; a transpacific supersonic airliner that is both economically viable and environmentally friendly; an aero-space plane that can fly cheaply to space; technologies for advanced unpiloted military aircraft; aircraft that can change their shape seamlessly in flight; advanced rotorcraft or tiltrotor aircraft that can offload the runways at our hub airports; a new generation of safe and easy-to-fly personal aircraft; advanced cockpits with synthetic vision, satellite navigation, and highway-in-the-sky technology; and, reduced runway spacing requirements and vortex control technology to increase hub airport throughput.

We believe that NASA's "Aeronautics Vision for the 21st Century" will agree with the problems facing U.S. aviation that we have outlined here, and that NASA can provide the solutions that are so desperately needed. We do not agree that the vision can be realized by reinvesting the already sub-critical aeronautics budget into a few potentially revolutionary new technologies. NASA must maintain a complete aeronautics program encompassing all of the relevant aeronautical disciplines and vehicle classes. Funding needs to be restored to the pre-1998 levels and the program revitalized to provide the desperately needed long-term technology solutions to America's civil and military aviation needs.

We believe that this can be accomplished only by a doubling of the aeronautics portion of NASA's budget over the next four years, from about 730 million dollars in FY01 to about 1,400 million dollars in FY05. (See attached charts 6 through 9.) This is not an unreasonable increase, considering the fact that NASA's aeronautics budget in FY98 was about 1 billion dollars in terms of FY01 dollars.

In conclusion, we believe that NASA's overall budget needs to be increased to provide the funds necessary for a world-class aeronautics research program -- that, as a result, it will no longer be necessary to rob aeronautics in order to pay for space projects -- and that the U.S. will regain its historic position as the world leader in both civil and military aviation. Our national economic wellbeing depends on it, our national defense depends on it, and it will impact the quality of life of all Americans. As we approach the one hundredth anniversary of the Wright brothers first flight at Kitty Hawk, NC in 2007, let it be said of this Congress that they had the wisdom to invest in the systematic research methods first demonstrated by Orville and Wilbur and practiced by NASA, that maintained U.S. world leadership in both aeronautics and space.